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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application for:

Christ, et al.

Serial No. 10/562,378

Filed: 10/12/2006

For: DETERMINING DISTANCES IN A WAREHOUSE

Examiner: Moffat, Jonathan

Art Unit: 2863

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Commissioner For Patents
P.O. Box 1450
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APPEAL BRIEF

Dear Sir:

The Applicant ("Appellant") submits the following Appeal Brief pursuant to 37 C.F.R. §41.37(c) for consideration by the Board of Patent Appeals and Interferences. A payment in the amount of $510.00 was submitted with the Notice of Appeal filed on February 27, 2008, (received by the Patent Office on March 3, 2008) as required by 37 C.F.R. §41.20(b)(1). A payment in the amount of $510.00 is submitted herewith as required by 37 C.F.R. §41.20(b)(2).

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I. REAL PARTY IN INTEREST

Thomas Christ and Ralf Schrankler are named as the inventors of the application. Thomas Christ and Ralf Schrankler transferred their rights in the subject application through an assignment executed on March 15, 2006 to SAP Aktiengesellschaft (SAP AG), a corporation of Germany having a principal place of business at Walldorf, Germany. An assignment is recorded at reel/frame number 021010/0687. Accordingly, SAP AG is the real party of interest.

II. RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences that will directly affect, be directly affected by or have a bearing on the Board's decision in this Appeal.

III. STATUS OF CLAIMS

Claims 1-31 are pending in the application. The Examiner has rejected claims 1-31. The Appellants respectfully appeal the rejection of claims 1-31.

IV. STATUS OF AMENDMENTS

No amendments were submitted after the Final Office Action mailed on February 4, 2008.

V. SUMMARY OF CLAIMED SUBJECT MATTER

The location of descriptions corresponding to the elements of the claims are identified by page and line numbers, as well as drawing reference numbers, from the originally filed applications as required by 37 C.F.R. 41.37 (c) (1) (v).

Claim 1 recites a "[m]"ethod of determining a path length of a path in a warehouse between a first location, which is in a source zone of the warehouse, and a second location, which is in a destination zone of the warehouse, each zone having at least one entry node and/or exit node," (See Abstract, pg. 1, col. 1, lines 23-30) the method comprising the following steps:

"determining the distance within the source zone between the first location and an exit node of the source zone;" (pg. 3, col. 1, lines 38-48; Fig. 2B step 1).

"determining the distance between the exit node of the source zone and an entry node of the destination zone;" (pg. 3, col. 1, lines 38-48; Fig. 2B step 2).

"determining the distance within the destination zone between the entry node of the destination zone and the second location;" (pg. 3, col. 1, lines 38-48; Fig. 2B step 3).

"obtaining the path length by summing up the distances determined in the preceding steps;" (pg. 3, col. 1, lines 38-48; Fig. 2B step 4).

"scheduling a resource to travel the path between the first location and the second location in response to a request, the scheduling of the resource based on a comparison of a priority of the request with a priority of a scheduled task" (pg. 7, col. 1, line 40 _ col. 2, line 15).

Claim 2 recites "wherein the distance within a zone is determined by applying a metric defined in the zone" (pg. 1, col. 1, lines 44-48 and pg. 3, col. 1, line 47 – col. 2, line 18).

Claim 3 recites "wherein the distance between two zones is determined by applying a line-of-sight principle" (pg. 1, col. 1, lines 45-48 and pg. 3, col. 1, line 47 – col. 2, line 18).

Claim 4 recites "wherein the location is defined by coordinates within the zone" (pg. 1, col. 1, lines 48-50 and pg. 2, col. 1, lines 21-27).

Claim 5 recites "wherein the exit node and the entry node are defined by coordinates within the respective zone" (pg. 1, col. 1, lines 49-50 and pg. 2, col. 1, lines 21-27).

Claim 6 recites "wherein the metric applied in a zone is one of Euclidean metric and Manhattan metric" (pg. 1, col. 1, lines 44-48 and pg. 3, col. 1, line 47 – col. 2, line 18).

Claim 7 recites "wherein the line-of-sight principle comprises determining the distance of the direct way between the two zones" (pg. 1, col. 2, lines 1-3 and pg. 3, col. 1, line 47 – col. 2, line 18).

Claim 8 recites "wherein determining the distance between the exit node of the source zone and an entry node of the destination zone comprises, in case there is an obstacle blocking

the direct way between the two zones, determining an additional distance for a path around the obstacle" (pg. 3, col. 1, lines 47 – col. 2, line 18).

Claim 9 recites "wherein the distances between nodes of two different zones are looked up in a table which comprises pre-calculated distances of each pair of nodes of different zones" (pg. 1, col. 2, lines 8-10 and pg 6. col. 2, lines 42-53).

Claim 10 recites "a method of determining a path in a warehouse for movement of a resource between a first location, which is in a source zone of the warehouse, and a second location, which is in a destination zone of the warehouse, wherein the path length is determined with the method of claim 1" (See Fig. 2B, 6B and Abstract).

Claim 11 recites "wherein the path is routed based on properties of at least one of a resource, a route, and a node" (pg. 1, col. 2, lines 16-18 and pg. 2, col. 2, lines 14-30).

Claim 12 recites "wherein the one path is determined which is the shortest path between the first location and the second location" (pg. 1, col. 2, lines 19-21).

Claim 13 recites "[m]ethod of calculating a path in a warehouse between a first location, which is in a source zone of the warehouse, and a second location, which is in a destination zone of the warehouse, each zone having at least one entry node and/or exit node," (See Abstract, pg. 1, col. 1, lines 23-30) the method comprising:

"determining a route from the first location to an exit node of the source zone;" (pg. 1, col. 2, lines 21-27; Fig. 6B step 1).

"determining the distance within the source zone between the first location and the exit node of the source zone;" (pg. 3, col. 1, lines 38-48, Fig. 2B step 1).

"determining a route from the exit node of the source zone to a pick and drop point associated with the source zone;" (Fig. 6B, step 3, pg. 1, col. 2, lines 33-35).

"determining the distance between the exit node of the source zone and the pick and drop point associated with the source zone;" (Fig. 6B, step 4, pg. 1, col. 2, lines 35-38).

"determining a route from the pick and drop point associated with the source zone to a pick and drop point associated with the destination zone;" (Fig. 6B, step 5, pg. 1, col. 2, lines 39-41).

"determining the distance between the pick and drop point associated with the source zone and the pick and drop point associated with the destination zone;" (Fig. 6B, step 6, pg. 1, col. 2, lines 42-44).

"determining a route from the pick and drop point associated with the destination zone to an entry node of the destination zone;" (Fig. 6B, step 7, pg. 1, col. 2, lines 45-47).

"determining the distance between the pick and drop point associated with the destination zone and the entry node of the destination zone;" (Fig. 6B, step 8, pg. 1., col. 2, lines 48-50).

"determining a route between the entry node of the destination zone and the second location;" (Fig. 6B, step 9, pg. 1, col. 2, lines 51 and 52).

"determining the distance within the destination zone between the entry node of the destination zone and the second location;" (Fig. 2B, step 3, pg. 1, col. 2, lines 53-55).

"obtaining the path length by summing up each of the determined distances;" (Fig. 6B, step 10, pg. 2, col. 1, lines 1 and 2).

"scheduling a resource to travel the path between the first location and the second location in response to a request, the scheduling of the resource based on a comparison of a priority of the request with a priority of a scheduled task" (pg. 5, col. 1, lines 9-18).

Claim 14 recites "wherein for each route, a resource is determined which is able to move on the route" (pg. 2, col. 1, lines 3 and 4).

Claim 15 recites "wherein only such routes are determined on which selected resources are able to move" (pg. 2, col. 1, lines 5 and 6).

Claim 16 recites "wherein the shortest path between the first location and the second location is determined" (pg. 2, col. 1, lines 7and 8).

Claim 17 recites "wherein the one path is determined which satisfies best a cost criterion, the cost criterion taking into account at least one of distances of the routes, travel time for the resource on the routes, and characteristics of the resources" (pg. 2, col. 1, lines 9-13).

Claim 18 recites "wherein after determining a respective route , then calculating a cost criterion, whereby calculating the cost criterion takes into account at least one of distances of the respective determined route, travel time for the resource on the respective determined route, and an average value of characteristics of all the resources for the respective determined route" (pg. 2, col. 1, lines 14-20).

Claim 19 recites a "[m]ethod of modeling a warehouse with a computer system, the warehouse comprising a plurality of bins for storing goods, a plurality of work centers for processing goods, and a plurality of resources for moving the goods in the warehouse;

the method comprising the following steps:" (pg. col. 1, lines 21-26).

"defining a first plurality of zones, each zone representing a grouping of bins, or a work center, whereby with each zone, at least one node is associated, the node representing an entry and/or exit point for resources to/from the zone, and whereby with each bin and with each node in a zone, coordinates are associated which are representative of their location in the zone;" (pg. 2, col. 1, lines 27-34).

"defining a first plurality or routes, each route representing a path for movement of a resource between nodes of a pair of zones, whereby with each of the routes, a path length is associated which is representative of the length of the route;" (pg. 2, col. 1, lines 35-39).

"defining a second plurality of routes, each route representing a path for movement of a resource within a zone between a bin and a node of the zone, wherein for each of the routes, a path length is associated which is representative of the length of the route; and" (pg. 2, ,col. 1, lines 40-45).

"scheduling a type of resource to travel a route determined from the path between the nodes of the pair of zones in response to a request, the scheduling of the type of resource based on a comparison of a priority of the request with a priority of a scheduled task" (pg. 5, col. 1, lines 9-18).

Claim 20 recites "further comprising defining a plurality of resource types, each resource type representing a kind of facility used for movement of a good within the warehouse" (pg. 2, col. 1, lines 46-49).

Claim 21 recites "further comprising defining a plurality of exceptions, each exception representing an obstacle for movement of a resource type on a route, whereby with each obstacle, a path length is associated which is representative of the length of the detour caused for the resource type to move around the obstacle" (pg. 2, col. 1, lines 50-55).

Claim 22 recites "further comprising defining a plurality of mandatory routes, each mandatory route representing a forced route for movement of a resource type, whereby with each mandatory route, a path length is associated which is representative of the length or the mandatory route" (pg. 2, col. 1, line 56 – col. 2, line 3).

Claim 23 recites "defining a further plurality of nodes, each of the nodes representing a predefined location in the warehouse outside the zones; and" (pg. 2, col. 2, lines 5-7).

"defining a third plurality or routes, each of the routes representing a path for movement of a resource between a node of the further plurality of nodes and a another node, whereby with each of the routes, a path length is associated which is representative of the length of the route" (pg. 2, col. 2, lines 8-13).

Claim 24 recites "further comprising associating with each resource type attributes which are descriptive of physical properties of the resource type" (pg. 2, col. 2, lines 14-18).

Claim 25 recites "further comprising associating with each node attributes which are descriptive of physical properties of the node" (pg. 2, col. 2, lines 19-22).

Claim 26 recites "further comprising associating with each route attributes which are descriptive of physical properties of the route" (pg. 2, col. 2, lines 23-26).

Claim 27 recites "wherein the second and third pluralities of routes are stored in a set of tables, each of the routes being referenceable by the two nodes between which the route is defined" (pg. 2, col. 2, lines 27-30).

Claim 28 recites "further comprising defining a second plurality of zones, each or the zones representing an entry and/or exit point to/from the warehouse, whereby with each zone, at least one node is associated, the node representing an entry and/or exit point for resources to/from the zone" (pg. 2, col. 2, lines 31-36).

Claim 29 recites "a computer-readable storage medium comprising code for performing the method of claim 1, when executed in a computer system" (pg. 2, col. 2, lines 37-39).

Claim 30 recites "a computer-readable storage medium comprising code for performing the method of claim 13, when executed in a computer system" (pg. 2, col. 2, lines 37-39).

Claim 31 recites "a computer-readable storage medium comprising code for performing the method of claim 19, when executed in a computer system" (pg. 2, col. 2, lines 37-39).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The issues involved in this appeal are as follows.

A. Whether claims 1-7, 9-20 and 29-31 are unpatentable under 35 U.S.C. § 103(a) as obvious over U.S. Patent No. 5,916,299 issued to Poppen ("Poppen") and in view of U.S. Patent No. 4,982,329 issued to Tabata ("Tabata"), U.S. Patent Publication No. 2003/0030399 by Jacobs ("Jacobs"), U.S. Patent No. 6,879,934 issued to Teig ("Teig"), U.S. Patent No. 6,429,016 issued to McNeil ("McNeil") and U.S. Patent No 4,973,219 issued to Brickner ("Brickner").

B. Whether claims 8 and 21-28 are unpatentable under 35 U.S.C. 103(a) as obvious over Poppen, Teig, Tabata, Jacobs, McNeil, Brickner and U.S. Patent Publication no. 2004/0068352 by Anderson ("Anderson").

All of the claims do not stand or fall together. The basis for the separate patentability of the claims as set forth below.

VII. ARGUMENT

A. Overview of the Prior Art

The Examiner rejected the Applicant's claims over the combination of 7 separate references. These references are introduced below. Each of these brief overviews is drawn from the Abstract of the respective references.

1. Overview of Poppen

A system for finding a path in a network between an origin in a first region and a destination in a second region. In finding this path, the system finds three paths: a path between the origin and an exit node for the first region, a path between an entrance node for the second region and the destination, and a path between the exit node and the entrance node. These three paths are combined to construct the path between the origin and the destination. A set of nodes for use as exit nodes or entrance nodes for a region may be identified by identifying a set of boundary nodes for the region and identifying a set of target nodes. The target nodes are each separated from the region by a sufficient cost. The set of target nodes may serve as a set of exit nodes or entrance nodes. The set of target nodes may also be modified to improve its operation as a set of exit nodes or entrance nodes.

2. Overview of Tabata

A self-contained unmanned vehicle (robot car) is described that is capable of independently traveling, on the basis of previously specified geographic data, to deliver parts or finished products in a factory. The vehicle includes a memory for storing the coordinate data of a node located on a traversable travel path, a memory for storing geographic data consisting of operation codes indicating the travel path conditions, and a scene command with the main operands denoting the continuous distance of the travel path under these operation codes, a decision-making unit for determining the path to be traversed by establishing the nodes to be traversed by the unmanned vehicle on its approach towards the designated target location, and a

travel control section for controlling the travel movement of the unmanned vehicle on the basis of scene commands in accordance with the pre-set sequence in which the predetermined nodes are to be traversed, a geographic data inputting device for entering the geographic data, and a geographic data display for displaying, during the input operation to enter the geographic data with the geographic data input device, line segments whose length corresponds to the value of the main operand, by means of a line type previously set in accordance with the operation code type.

3. Overview of Jacobs

A robot that reacts to external impact through a robot touch shield device comprising a shell supported by at least one shell support member mounted on a base member, and a sensor device for sensing an exterior force applied to the shell. The sensor device has a base sensor portion having a center and a vertical member, the base sensor portion is affixed on the base member. The vertical member is affixed to the shell. The vertical member is positioned over the center of the base sensor portion, wherein the exterior force applied to the shell translates the shell relative to the base member. The base sensor portion senses a displacement of the vertical member relative to the center of the base sensor portion and produces an output representing at least one of a direction of the exterior force applied and the degree of the exterior force applied.

4. Overview of Teig

A method that computes an estimated distance between an external point and a set of points in a region. This method initially identifies a non-Manhattan polygon that encloses the set of points. It then identifies a distance between the external point and a point on the boundary or within the first non-Manhattan polygon. Finally, it uses the distance to identify the estimated distance.

5. Overview of McNeil

A system and method for positioning a sample, or cargo, with respect to a device in a robotic system is described. The system includes a macro positioning system for "gross" movement of the sample between stations and a micro positioning system for precisely locating the sample in a predetermined location at a station with respect to a device that will interact with

the sample. The macro positioning system provides a positioning mechanism for the general movement of a sample along a pathway between various destinations or stations wherein the sample is "grossly" positioned with respect to the station. Once at the station, the micro positioning subsystem disposed between a sample carrier and the station provides a positioning mechanism for "precisely" positioning the sample in a predetermined location at the station with respect to a device that will interact with, or perform some function on, the sample. The system and method provide for multiple sample carrying robots having autonomous navigation thereby providing flexibility and stacker-like queuing.

6. Overview of Brickner

The invention is a container storage yard adjacent to a facility for loading and unloading containers, such as to and from ships, with the individual containers stored therein being stacked up to four containers high. An integrated container handling system is designed to move the containers from the container storage yard to the loading and unloading facility, and includes an overhead grid rail system on which container carrying shuttle vehicles are routed to designated yard locations by a master control system. Passive switching mechanisms are utilized to selectively move the shuttle vehicles through the grid rail network, wherein the actual switch mechanism is carried on the shuttle vehicle rather than on the track. One disclosed embodiment of the loading and unloading facility comprises overhead cranes and associated buffers in a marine terminal for loading and unloading a container ship. The present invention is also particularly applicable to intermodal facilities for transferring shipping containers between different types of container shipping systems, such as between container transport ships and rail cars.

7. Overview of Anderson

A method and system that determines a work path for a machine and determines a path that minimizes energy consumption of the machine to enhance a usable duration of an electrical charge of an energy source or to conserve fuel. A work area is defined and is divisible into a number of cells. Respective geographic factors associated with corresponding cells within the work area are defined. An estimator estimates energy levels, associated with a machine moving in or between adjacent cells, in corresponding proposed directions based on at least one

geographic factor (e.g., any change in elevation between or within the adjacent cells). Candidate total energy levels are determined for moving the machine through the cells along corresponding alternate proposed work paths for the work area. A selector selects a preferential work path from the proposed work paths consistent with the determined lowest energy level of the candidate total energy levels.

B. Rejection of Claims 1-31, under 35 U.S.C. § 103

To establish a *prima facie* case of obviousness the Examiner must set forth a clear articulation of the reasons that the claimed invention would have been obvious. The reasoning cannot be based on mere conclusory statements. See *KSR International Co. v Teleflex, Inc.*, 550 US___, 82 USPQ2d 1385, 1396, (2007) and MPEP § 2142. Further, the federal circuit has clarified that the determination of the proper combination of prior art teachings in light of the Supreme Court's decision in KSR is based on the flexible application of the teachings, suggestion and motivation (TSM) test, because "as the Supreme Court suggests, a flexible approach to the TSM test prevents hindsight and focuses on evidence before the time of the invention." *In re Translogic Technology Inc.*, 504 F.3d 1249, 1257, (Fed Cir. 2007). Further, if the proposed modification or combination of the prior art changes "the principal of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. "*In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959) and MPEP § 2143.01 VI. In *In Re Ratti*, the court overturns a rejection holding that "the suggested combination of references would require substantial reconstruction and re-design of the elements shown in [the primary reference] as well as a change in the basic principal in which the [primary reference] construction is designed to operate." *In Re Ratti* at 270 F.2d at 813, 123 USPQ at 352. Further, the disclosure of a reference "must provide an enabling disclosure of the desired subject matter; merely naming or description of the subject matter is insufficient," See *Elan Pharmaceuticals, Inc. v Mayo Foundation for Medical Education and Research*, 346 F.3d 1051, 1054, 68 USPQ2d 1373, 1376 (Fed Cir. 2003) and MPEP § 2121.01.

1. Claims 1, 2, 4, 6, 9-11, 19, 29 and 31

Claim 1 includes the elements of

> Method of determining a path length of a path in a warehouse between a first location, which is in a source zone of the warehouse, and a second

location, which is in a destination zone of the warehouse, each zone having at least one entry node and/or exit node, the method comprising the following steps:
determining the distance within the source zone between the first location and an exit node of the source zone;
determining the distance between the exit node of the source zone and an entry node of the destination zone;
determining the distance within the destination zone between the entry node of the destination zone and the second location;
obtaining the path length by summing up the distances determined in the preceding steps; and
scheduling a resource to travel the path between the first location and the second location in response to a request, the scheduling of the resource based on a comparison of a priority of the request with a priority of a scheduled task.

In making the combination of references (Poppen, Jacobs, Tabata, Teig, McNeil and Brickner), the Examiner has failed to consider the elements of claims in the context of the whole of the claim. Each of the determination of distances in claim 1 is performed prior to the calculation of a complete path distance, because the complete path distance is a summation of these individually determined distances. In contrast, the primary reference Poppen teaches a system where the path finding relies upon a known set of costs between nodes in a directed graph. See figures 2A, 2B, 3 and accompanying disclosure of Poppen, see also, col. 5, lines 38-43 of Poppen.

The robot based distance determining methodology of Jacobs and Tabata are each incompatible with the requirements of Poppen. Neither of these references teaches the determination of distances prior to the calculation of the path. Rather, each makes distance calculations during the traversal of the path. In regard to Jacobs, the cited paragraph [0093] describes the use of an odometer to track a distance traversed by the robot. In regard to Tabata, the distance measuring sensors are utilized to detect the distance of the robot from nearby reference points such as walls. See col. 10, lines 49-59 of Tabata. All other distance data in Tabata is to be received by data entry such as the distance data referred to in the cited section provided by the Examiner, col. 4, lines 1-21. The Appellants found further clarification of the data entry process of Tabata at col. 7, line 47-col. 9, line 61. Therefore, Poppen in view of Jacobs and Tabata does not teach the determination of distances that form the complete path as recited in claim 1. Further, the Examiner has not indicated and the Appellants have been unable

to discern any part of Teig, McNeil or Brickner that cures these deficiencies of Poppen, Tabata and Jacobs.

The Examiner also acknowledges that Poppen fails to disclose "the scheduling of the resources based on a comparison of the priority of the request with the priority of the scheduled task." See page 6 of the Final Office Action. In regard to the scheduling of the resource to the path calculated in the other elements of claim 1, the Examiner cites Fig. 5 of Poppen and states "this is assumed or else the planning of the route would have no functional value." However, the Examiner's assumption is not supported by Poppen. In fact, Poppen discloses a utility for path finding that is unrelated to the scheduling of a resource along the travel path. Poppen provides the example of the use of pathfinding in a car navigation system. See paragraph [0005] lines 51-65. In this scenario no scheduling takes place as the path is provided as a guide to the user no scheduling is performed by the navigation device.

The Examiner relies on Brickner for curing the defects of Poppen, in relation to the scheduling of a resource to travel a path. The Examiner cites Figures 1-3 and column 17, line 63- column 18, line 14 of Brickner. However, Figures 1-3 of Brickner illustrate the grid rail system and do not provide any discernable disclosure relating to scheduling. In regard to col. 17, line 63 – col. 18, line 14, the entirety of the disclosure relating to automated scheduling provided by this section of Brickner, states "[w]ith automated shuttles with automatic task assignments, the RTC assigns shuttles from the available pool to the tasks in a priority sequence and keeps track of all shuttles at all times. The RTC also controls traffic, coordinates shuttles, optimizes assignments, and optimizes shuttle routes." However, the disclosure provides no details as to the manner in which any scheduling or assignments are made. Thus, Brickner does not provide an enabling disclosure that can be said to teach the scheduling of a resource on a path based on the comparison of the priority of the request with the priority of the scheduled task as required by § 2121.01 and *Elan Pharm. Inc. v. Mayo Found. for Med. Edu. and Res.* Therefore, Brickner does not cure the defects of Poppen. Further, the Examiner does not rely upon and the Appellants have been unable to discern any part of Jacobs, Tabata, Teig or McNeil that cure these defects of Poppen.

Further, the proposed combination of Poppen with Tabata, Teig, Jacobs, McNeil and Brickner would improperly change the principal of operation of Poppen. See *In re Ratti* and MPEP § 2143.01, Poppen's path finding method relies on an input of a directed graph

datastructure or analogous datastructure, which is then organized into a set of tiles and searched for a path between designated points in the network. See Poppen figures 2A, 2B, 3 and accompanying disclosure, as well as col. 5, lines 38-43 of Poppen. Tabata, McNeil and Jacobs each disclose a distinct robotic system with its own requirements for functionality and methods of path finding. Teig is not relied on for path finding. Rather, it is relied on for a specific type of distance measurement. In regard to McNeil, even though the Examiner has cited this reference as part of the obviousness rejection of claim 1, the Examiner does not indicate or rely upon any teachings within this reference. The robotic system of Tabata relies on reference information and continuous sensory input of the surroundings in order to navigate a path laid out by a user. It is unclear how this information would be incorporated into a system requiring an input of a directed graph such as Poppen without changing its basic fundamental operating principal. Similarly, the section of Jacobs relied upon by the Examiner discloses that distances are measured by an odometer. See paragraph [0093] of Jacobs. Since this information can only be gathered during the traversal of a path it is unclear how this teaching can be incorporated into Poppen, which relies on a complete directed graph or analogous data to calculate the path that the robot in Jacobs would presumably be measuring.

In regard to Brickner, the system of Brickner is based on a rigid grid system, see Figure 1 of Brickner. The Examiner has not identified and the Appellants have been unable to discern any need in the system of Brickner for a path finding algorithm since the movement options are simple and thus the pathfinding utilized in Poppen is not necessary. The basic discussion of scheduling in relation to the grid system provides no indication that such scheduling would be applicable to other infrastructures such as the networks modeled by Poppen. Those networks require a known cost between nodes, but the nodes can have any set of inter-relationships. Thus, combining any scheduling system based on the simple grid system of Brickner would necessarily impose the same restrictions or rely on the same movement restrictions as exist in Brickner thereby making the path finding system of Poppen unsuitable for its intended purpose. Thus, it is unclear how the Examiner can establish that one of ordinary skill in the art would think to combine these references with Poppen. Therefore, the cited references cannot be properly combined to teach or suggest each of the element of claim 1. Accordingly, it is requested that the obviousness rejection of claim 1 can be overturned.

Claim 19 includes elements analogous to those of claim 1. Thus, for the reasons

mentioned above the cited references cannot be properly combined to teach or suggest each of the elements of these claims. Accordingly, it is requested that the obviousness rejection of these claims also be overturned. In regard to claims 2, 4, 6, 9, 10, 11, 29 and 31 these claims depend from claims 1 and 19, respectively, and incorporate the limitations thereof. Therefore, it is requested that the obviousness rejection of these claims also be overturned.

3. Claims 3 and 7

Claim 3 depends from independent claim 1 and incorporates the limitations thereof. Thus, at least for the reasons mentioned above in regard to independent claim 1, the cited references do not teach or suggest claim 3. In addition, claim 3 is separately patentable for the following reasons.

This claim includes the elements of "wherein the distance between two zones is determined by applying a line-of-sight principal." For this position, the Examiner states that "using a line-of-sight based device such a range finder, radar, GPS, or other device would have been obvious to one of ordinary skill in the art and that such a method would inherently generate a distance that is 'direct way'." See pg. 6 of the Final Office Action. The Examiner specifically cites Tabata for disclosing an ultrasonic line-of-sight range finding device in Figure 2 items as 6L and 6R. The Examiner provides no support or reasoning specifying the structures of Poppen that would interface with such a range finder or similar line-of-sight device. Thus, it is unclear how the Examiner has provided articulated reasoning for combination of such a device with Poppen. The Examiner has cited no section of Poppen that is related to a generation of a network of information. Rather, as discussed previously, Poppen is directed to a pathfinding process that is given a network such as a directed graph as input. Also, the ultrasonic line-of-sight range finding device is not utilized for determination of distances between zones but rather is utilized to determine the distances to reference objects. See Tabata, Figure 1 illustrating that the sensors 6L and 6R are positioned on either side of the robot, see also column 10, lines 49-59. Thus, the Examiner has failed to establish that the elements of claim 3 are taught or suggested by Poppen in combination with Tabata.

The Examiner has not provided any citation or reasoning to support a reliance on Teig, McNeil, Jacobs or Brickner to cure these defects of Poppen and Tabata. Thus, the Examiner has

failed to establish that the cited references, combined, teach or suggest each of the elements of claim 3. Accordingly, it is requested that the obvious rejection of claim 3 be overturned.

Claim 7 depends from claim 3 and incorporates the limitations thereof. Thus, at least for the reasons mentioned above, these claims are also patentable over the cited references. Accordingly, it is requested that the obviousness rejection of these claims be overturned.

5. Claim 5

This claim depends from independent claim 1 and incorporates the limitations thereof. Thus, at least for the reasons mentioned above in regard to independent claim 1, claim 5 is not obvious over the cited references. Claim 5 is also separately patentable for the following reasons.

Claim 5 includes the elements of "wherein the exit node and the entry node are defined by coordinates within the respective zone." The Examiner relies on col. 4, lines 10-21 of Poppen as disclosing these elements of claim 5. However, the cited section of Poppen discloses only that the network may be stored in memory in the form of a map or the data necessary to construct the map. Such data could include longitude and latitude data. See Poppen col. 4, lines 10-21. However, an exit node and an entry node are not parts of a map. The Examiner has failed to identify any part of Poppen that discloses that such latitude and longitude data would be relied upon in identifying exit and entry nodes within tiles that are identified as part of a pathfinding process. Thus, the Examiner has failed to establish that this element is taught or suggested by Poppen. Further, the Examiner has not identified and the Appellants have been unable to discern any part of Tabata, Jacobs, Teig, McNeil or Brickner that cures this defect of Poppen. Accordingly, it is requested that the obviousness rejection of claim 5 be overturned.

7. Claim 12

Claim 12 depends from independent claim 1 and incorporates the limitations thereof. Thus, at least for the reasons mentioned above in regard to independent claim 1, claim 12 is not obvious over the cited references. Further, claim 12 is separately patentable for the following reasons.

Claim 12 includes the elements of "wherein the one path is determined which is the

shortest path between the first location and the second location." When this limitation is read in the context of the entire claim from which it depends, namely from claim 1, it is clear that the first location is in a source zone of a warehouse and a second location is in a destination zone of a warehouse. The Examiner has cited Fig. 8B and item 331B of Poppen as disclosing this element of claim 12. However, 8B is part of a process for identifying a set of exit target nodes, specifically step 331B is part of the process of identifying an adjacent node with the least cost. See col. 13, lines 25-66 of Poppen. Thus, the cited section of Poppen relied upon by the Examiner does not teach the determination of the path between two zones, it discloses a process for selecting the best exit node. Therefore, the Examiner has not set forth a proper *prima facie* case of obviousness for claim 12 by providing reasoning as to how Poppen teaches or suggests each of the elements of claim 12. Further, the Examiner has not relied on and the Appellants have been unable to discern any part of Tabata, Jacobs, Teig, McNeil or Brickner that cure these defects of Poppen. Accordingly, reconsideration and withdrawal of the obviousness rejection of claim 12 are requested.

8. Claim 13

Claim 13 includes many of the same elements as independent claim 1 and is patentable for each of the reasons mentioned therein. Claim 13 includes additional elements that are not taught or suggested by the cited references and is separately patentable for that reason.

Claim 13 includes elements of "determining a route from the pick up and drop point associated with the source zone to the pick up and drop point associated with the destination zone" and "determine the distance between the pick up and drop point associated with the source zone and the pick and drop point associated with the destination zone." The Examiner has not alleged that the cited references teach or suggest these elements of claim 13. Rather, the Examiner has made only general comments that the concept of pick up and drop points are disclosed in the cited references. The Examiner has stated that "plotting and programming additional points for the robot to travel to within various zones, would have been obvious to one of ordinary skill in the art." See page 8 of the final Office Action. However, the Examiner's statement is entirely conclusory and does not provide the requisite reasoning as to how drop points will be incorporated into the pathfinding algorithm of Poppen. Further, the Examiner has provided no reasoning as to why or how one of ordinary skill in the art would make such

programming modifications to Poppen. Rather, such incorporation of pick up and drop points would appear to change the basic operating principle of Poppen. As discussed above, Poppen's operation is predicated on pathfinding from a first point to a second point within a network that can be modeled using a directed graph. The Examiner has not provided any reasoning as to how the search algorithm of Poppen can be modified to incorporate these pick up and drop points. Specifically, the Examiner has not provided any reasoning as to how Poppen would be modified to not only calculate a route between two pick up and drop points that are in two separate zones, but also to calculate of a distance between these points. The Examiner has not identified any part of any of the references that explicitly teach such a calculation. Nor has the Examiner set forth any clear reasoning as to why one of ordinary skill in the art would understand the references to include this teaching or suggestion implicitly. Therefore, the Examiner has failed to set forth a *prima facie* case of obviousness for claim 13 because he has failed to set forth clear reasoning as to how each of these references (Poppen, Tabata, Jacobs, Teig, McNeil and Brickner) can be combined to teach the specific elements of claim 13 in such a way that the Appellants can reasonably be able to ascertain whether one of ordinary skill in the art would be able to perform such modifications without undue experimentation. And that such modifications would be in accordance with the flexible teaching, suggestion or motivation test. Accordingly, it is requested that the obviousness rejection of claim 13 be overturned.

Claim 16, 17 and 30 depend from claim 13 and incorporate the limitations thereof. Thus, at least for the reasons mentioned in regard to claim 13, these claims are also patentable over the cited references. Accordingly, it is requested that the obviousness rejection of these claims be overturned.

9. Claims 14 and 15

Claims 14 and 15 depend from independent claim 13 and incorporate the limitations thereof. Thus, at least for the reasons mentioned above in regard to independent claim 13, these claims are not obvious over the cited references. These claims include additional elements not taught or suggested by the cited references and are separately patentable for that reason.

Claim 14 include the elements of "wherein for each route, a resource is determined which is able to move on the route" and "wherein only such routes are determined on which selected

resources are able to move." The Examiner takes the position on pages 6 and 7 of the final Office Action that Poppen discloses "foreknowledge of the physical characteristics of the routes and whether or not one would be suitable for choosing" citing col. 1, lines 51-60 and that the application of "the method of Poppen to a warehouse robot, the examiner believes that such features are obvious." See pg. 6 and 7 of the Final Office Action. However, the Examiner's suggested combination involves a scenario where the route finding algorithm of Poppen is applied to a robot and thus there are not multiple resources to be selected from whereas both of claims 14 and 15 involve the notion of either selecting a resource that is compatible with a route or selecting a route compatible with a resource. However, there appears to be no resource selection in Poppen that takes into account route characteristics or vice versa. Rather, the system of Poppen incorporates route restrictions into the network information. Thus, there would be no nodes or connections between nodes where it is not possible to route something due to restrictions. See col. 1, lines 50-60 of Poppen. There would be no need to make a selection of a resource or determine a resource because the network information of Poppen is tied to a particular resource. Also, the cited section of Poppen does not teach resource based restrictions. Rather, these sections teach general route restrictions as related to the connectivity of roads, which would be translated into a network representation. The Examiner has not identified and the Appellant has not been able to discern any part of the other cited reference Jacobs, Tabata, McNeil, Teig or Brickner that cure these defects of Poppen. Therefore, the Examiner has failed to establish that the cited references, combined, teach or suggest these additional elements of claims 14 and 15. Accordingly, it is requested that the obviousness rejection of these claims be overturned.

11. Claim 18

Claim 18 depends from claim 13 and incorporates the limitations thereof. Thus, at least for the reasons mentioned above in regard to claim 13, claim 18 is not obvious over the cited references. Claim 18 includes additional elements that are not taught or suggested by the cited references and is separately patentable for that reason.

Claim 18 includes the elements of "wherein after determining a respective route, then calculating a cost criterion." The Examiner cites Fig. 4, Figs. 8A and 8B and col. 1, lines 35-48. However, the Appellants have reviewed each of the cited sections of Poppen but have been

unable to determine any part therein that teaches the determination of a cost criterion after determination of a route. Rather, the cited figures do not appear to teach any type of cost calculation. The cited section of Poppen discusses only the inclusion of cost in a network. However, networks are input information into the algorithm and thus will not be calculated after a route is determined. Therefore, the Examiner has failed to properly established that Poppen teaches or suggests each of the elements of claim 18.

Further, the Examiner has not indicated and the Appellants have been unable to discern any part of the other cited references that teach or suggests these elements of claim 18 and thereby cure the defects of Poppen. Therefore, the Examiner has failed to establish a *prima facie* case of obviousness for claim 18. Accordingly, it is requested that the obviousness rejection of claim 18 be overturned.

13. Claim 20

Claim 20 depends from independent claim 19 and incorporates the limitations thereof. Thus, at least for the reasons mentioned above in regard to independent claim 19, claim 20 is not obvious over the cited references. Claim 20 includes additional elements that are not taught or suggested by the cited references and is separately patentable for this reason.

Claim 20 includes the elements of "defining a plurality of resource types, each resource type representing a kind of facility used for movement of a good within the warehouse." The Examiner has rejected claim 20 in combination with claims 14 and 15. However, the discussion of the rejection of these claims on pages 6 and 7 of the final Office Action, do not address the elements of claim 20. Rather, the arguments seem to be focused solely on the elements of claims 14 and 15 and do not address the elements of claim 20. Thus, the Examiner has failed to set forth the requisite reasoning for establishing a *prima facie* case of obviousness. Specifically, the Examiner has not set forth in what manner any of the cited references teach or suggest "defining a plurality of resource types" or "resource types" that represent a "kind of facility for movement for a good within a warehouse." Thus, the Examiner has failed to establish a *prima facie* case of obviousness for claim 20. Accordingly, it is requested that the obviousness rejection of claim 20 be overturned.

C. Claims rejected under 35 U.S.C. § 103 as unpatentable over Poppen, Teig, Tabata, Jacobs, McNeil, Brickner and Anderson.

1. Claim 8

Claim 8 depends from independent claim 1 and incorporates the limitations thereof. Thus, at least for the reasons mentioned above in regard to independent claim 1, Poppen, Teig, Tabata, Jacobs, McNeil and Brickner do not teach or suggest each of the elements of this claim. Further, the Examiner does not indicate and the Appellants have been unable to discern any part of Anderson that cures the defects of the other cited references in regard to the elements of claim 1.

Claim 8 includes the additional element of "in case there is an obstacle blocking the direct way between the two zones, determining an additional distance for a path around the obstacle." The Examiner acknowledges that Poppen and the other cited references except Anderson do not teach or suggest the elements of claim 8. The Examiner relies on Anderson for "factoring an obstacle and directing the route around such an obstacle" citing col. 3, lines 12-17 and col. 5, lines 47-52 of Anderson. The Appellants reviewed Anderson but had difficulty finding the cited sections of Anderson because Anderson is labeled by paragraph numbers not by columns and line numbers. The Appellants were unable to discern any part of the cited sections where Anderson estimated or determined the distance around an obstacle. Further, when the elements of claim 8 are read as whole with the elements of claim 1 it is clear that the determination of the distance around an obstacle is part of the overall calculation of the route length. The Examiner has not indicated and the Appellants have been unable to discern any part of Anderson or the other cited references that include the distance around a obstacle on the path as part of the overall route length. Thus, the Examiner has failed to establish a *prima facie* case of obviousness for claim 8. Accordingly, it is requested that the obviousness rejection of claim 8 be overturned.

2. Claim 21-28

Claim 21 depends from claim 19 and incorporates the limitations thereof. Thus, at least for the reasons mentioned above in regard to independent claim 19, the cited references other than Anderson do not teach or suggest each of the elements of this claim. The Examiner has not indicated and the Appellants have been unable to discern any part of Anderson that cures the

defects identified in regard to claim 19. In addition, claim 21 includes elements that are not part of claim 19 and is separately patentable for this reason.

Claim 21 includes elements of "defining a plurality of exceptions, each exception representing an obstacle for movement of a resource type on a route, whereby with each obstacle, a path link is associated which is representative of the length of the detour caused for the resource type to move around the obstacle." The Examiner has not identified and the Appellants have been unable to discern any part of the cited references that define a set of exceptions that correspond to obstacles. Thus, the Examiner has failed to allege this element of claim 21. Further, claim 21 includes elements similar to those of claim 8 when a route is determined to blocked by an obstacle then the length of the detour is calculated. Thus, for the reasons mentioned above in regard to claim 8 the cited reference does not teach or suggest each of the elements of claim 21. Accordingly, it is requested that obviousness rejection of claim 21 be overturned.

Claim 22-28 depend from claim 21 and incorporate the limitations thereof. Thus, at least for the reasons mentioned above in regard to claim 21, the cited references do not teach or suggest these claims. Accordingly, it is requested that the obviousness rejection of these claims be overturned.

For the reasons set forth above, the Appellant respectfully requests the Board overturn the rejection of claims 1-31 as being obvious in view of the art of record.

Respectfully submitted,

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Melissa Stead

Melissa Stead 6-23, 2008

VIII. CLAIMS APPENDIX

The claims involved in this Appeal are:

1. (Previously Presented) Method of determining a path length of a path in a warehouse between a first location, which is in a source zone of the warehouse, and a second location, which is in a destination zone of the warehouse, each zone having at least one entry node and/or exit node, the method comprising the following steps:

determining the distance within the source zone between the first location and an exit node of the source zone;

determining the distance between the exit node of the source zone and an entry node of the destination zone;

determining the distance within the destination zone between the entry node of the destination zone and the second location;

obtaining the path length by summing up the distances determined in the preceding steps; and

scheduling a resource to travel the path between the first location and the second location in response to a request, the scheduling of the resource based on a comparison of a priority of the request with a priority of a scheduled task.

2. (Original) The method of claim 1, wherein the distance within a zone is determined by applying a metric defined in the zone.

3. (Original) The method of claim 1, wherein the distance between two zones is determined by applying a line-of-sight principle.

4. (Original) The method of claim 1, wherein the location is defined by coordinates within the zone.

5. (Original) The method of claim 1, wherein the exit node and the entry node are defined by coordinates within the respective zone.

6. (Original) The method of claim 2, wherein the metric applied in a zone is one of Euclidean metric and Manhattan metric.

7. (Original) The method of claim 3, wherein the line-of-sight principle comprises determining the distance of the direct way between the two zones.

8. (Previously Presented) The method of claim 7, wherein determining the distance between the exit node of the source zone and an entry node of the destination zone comprises, in case there is an obstacle blocking the direct way between the two zones, determining an additional distance for a path around the obstacle.

9. (Original) The method of claim 1, wherein the distances between nodes of two different zones are looked up in a table which comprises pre-calculated distances of each pair of nodes of different zones.

10. (Original) A method of determining a path in a warehouse for movement of a resource between a first location, which is in a source zone of the warehouse, and a second location, which is in a destination zone of the warehouse, wherein the path length is determined with the method of claim 1.

11. (Original) The method of claim 10, wherein the path is routed based on properties of at least one of a resource, a route, and a node.

12. (Original) The method of claim 11, wherein the one path is determined which is the shortest path between the first location and the second location.

13. (Previously Presented) Method of calculating a path in a warehouse between a first location, which is in a source zone of the warehouse, and a second location, which is in a destination zone of the warehouse, each zone having at least one entry node and/or exit node, the method comprising:

determining a route from the first location to an exit node of the source zone;

determining the distance within the source zone between the first location and the exit node of the source zone;

determining a route from the exit node of the source zone to a pick and drop point associated with the source zone;

determining the distance between the exit node of the source zone and the pick and drop point associated with the source zone;

determining a route from the pick and drop point associated with the source zone to a pick and drop point associated with the destination zone;

determining the distance between the pick and drop point associated with the source zone and the pick and drop point associated with the destination zone;

determining a route from the pick and drop point associated with the destination zone to an entry node of the destination zone;

determining the distance between the pick and drop point associated with the destination zone and the entry node of the destination zone;

determining a route between the entry node of the destination zone and the second location;

determining the distance within the destination zone between the entry node of the destination zone and the second location;

obtaining the path length by summing up each of the determined distances ; and

scheduling a resource to travel the path between the first location and the second location in response to a request, the scheduling of the resource based on a comparison of a priority of the request with a priority of a scheduled task.

14. (Original) The method of claim 13, wherein for each route, a resource is determined which is able to move on the route.

15. (Original) The method of claim 13, wherein only such routes are determined on which selected resources are able to move.

16. (Original) The method of claim 13, wherein the shortest path between the first location and the second location is determined.

17. (Original) The method of claim 13, wherein the one path is determined which satisfies best a cost criterion, the cost criterion taking into account at least one of distances of the routes, travel time for the resource on the routes, and characteristics of the resources.

18. (Previously Presented) The method of claim 13, wherein after determining a respective route, then calculating a cost criterion, whereby calculating the cost criterion takes into account at least one of distances of the respective determined route, travel time for the resource on the respective determined route, and an average value of characteristics of all the resources for the respective determined route.

19. (Previously Presented) A method of modeling a warehouse with a computer system, the warehouse comprising a plurality of bins for storing goods, a plurality of work centers for processing goods, and a plurality of resources for moving the goods in the warehouse;

the method comprising the following steps:

defining a first plurality of zones, each zone representing a grouping of bins, or a work center, whereby with each zone, at least one node is associated, the node representing an entry and/or exit point for resources to/from the zone, and whereby with each bin and with each node in a zone, coordinates are associated which are representative of their location in the zone;

defining a first plurality or routes, each route representing a path for movement of a resource between nodes of a pair of zones, whereby with each of the routes, a path length is associated which is representative of the length of the route;

defining a second plurality of routes, each route representing a path for movement of a resource within a zone between a bin and a node of the zone, wherein for each of the routes, a path length is associated which is representative of the length of the route; and

scheduling a type of resource to travel a route determined from the path between the nodes of the pair of zones in response to a request, the scheduling of the type of resource based on a comparison of a priority of the request with a priority of a scheduled task.

20. (Original) The method of claim 19, further comprising defining a plurality of resource types, each resource type representing a kind of facility used for movement of a good within the warehouse.

21. (Original) The method of claim 20, further comprising defining a plurality of exceptions, each exception representing an obstacle for movement of a resource type on a route, whereby with each obstacle, a path length is associated which is representative of the length of the detour caused for the resource type to move around the obstacle.

22. (Original) The method of claim 21, further comprising defining a plurality of mandatory routes, each mandatory route representing a forced route for movement of a resource type, whereby with each mandatory route, a path length is associated which is representative of the length or the mandatory route.

23. (Previously Presented) The method of claim 22, further comprising:

defining a further plurality of nodes, each of the nodes representing a predefined location in the warehouse outside the zones; and

defining a third plurality or routes, each of the routes representing a path for movement of a resource between a node of the further plurality of nodes and a another node, whereby with each of the routes, a path length is associated which is representative of the length of the route.

24. (Original) The method of claim 23, further comprising associating with each resource type attributes which are descriptive of physical properties of the resource type.

25. (Original) The method of claim 24, further comprising associating with each node attributes which are descriptive of physical properties of the node.

26. (Original) The method of claim 25, further comprising associating with each route attributes which are descriptive of physical properties of the route.

27. (Original) The method of claim 26, wherein the second and third pluralities of routes are stored in a set of tables, each of the routes being referenceable by the two nodes between which the route is defined.

28. (Original) The method of claim 27, further comprising defining a second plurality of zones, each or the zones representing an entry and/or exit point to/from the warehouse, whereby with each zone, at least one node is associated, the node representing an entry and/or exit point for resources to/from the zone.

29. (Original) A computer-readable storage medium comprising code for performing the method of claim 1, when executed in a computer system.

30. (Original) A computer-readable storage medium comprising code for performing the method of claim 13, when executed in a computer system.

31. (Original) A computer-readable storage medium comprising code for performing the method of claim 19, when executed in a computer system.

IX. EVIDENCE APPENDIX

There is no evidence relevant to this appeal.

X. RELATED PROCEEDINGS APPENDIX

There are no other appeals or interferences that will directly affect, be directly affected by, or have a bearing on the Board's decision in this appeal.